Refer to: Hess GH: Cardiopulmonary resuscitation in rural community hospitals. West J Med 128:282-284, Apr 1978

Cardiopulmonary Resuscitation in Rural Community Hospitals

GEORGE H. HESS, MD, *Carson City, Nevada*

Carson-Tahoe Hospital is a 77-bed hospital serving a large rural area. During 22 months cardiopulmonary resuscitation was carried out 89 times in 79 persons. Of these resuscitations, 56 were done in the emergency room and 25 on inpatients. Resuscitation was successful in 46 percent of the patients at least once, and 30 percent of the patients lived and were released. These figures compare favorably with those from larger, urban centers, despite problems unique to smaller hospitals.

REDUCING NUMBERS OF DEATHS by extending life-saving and life support methods beyond hospital walls has become a major goal in many centers.[1] In urban areas reduced morbidity and mortality have been reported with such efforts.[2,3] Rural areas with their greater distances, transportation problems and sparse populations would appear to be less than ideal for successful application of these methods.[4] In addition, it would seem difficult for small hospitals without house staffs to match statistics from larger centers.

Carson-Tahoe Hospital is a 77-bed hospital, located in Carson City, Nevada. In addition to serving Carson City, it serves all or part of five Nevada counties and portions of two California counties in an area 50 miles wide by 60 miles long (see Figure 1). An estimated 40,000 people lived within this area at the time of the study and it is constantly visited by a large, but variable, number of tourists. Transportation over mountain highways and passes presents major challenges to providing prehospital medical care.

Cardiopulmonary resuscitations (CPR) at Carson-Tahoe Hospital were reviewed by the Medical Pediatrics Committee and the results of that review are the subject of this report. Inpatient as well as emergency room CPR's are included.

From the Departments of Medicine and Pediatrics, Carson-Tahoe Hospital, Carson City, Nevada.

Submitted November 30, 1977.

Reprint requests to: George H. Hess, MD, Carson Medical Group, Carson Medical Center, Carson City, NV 89701.

Methods

All CPR's carried out between January 1975 and October 1976 were reviewed. CPR was done 89 times in 79 persons. However, eight persons in whom CPR was carried out were judged dead on arrival because of the findings of fixed, dilated pupils; absence of any spontaneous respiratory and cardiac activity; lack of electrical cardiac activity, and absence of response to any of the resuscitative efforts.

In the remaining 71 persons, CPR was carried out 81 times. Of this number, 56 of the procedures were done in the emergency room on newly arrived patients and 25 on inpatients. Careful review of these records showed that the care generally conformed to the standards for cardiopulmonary resuscitation published by the National Conference on Cardiopulmonary Resuscitation in 1974.[5]

Results

Table 1 separates the inpatient and emergency room CPR's and lists the number of successful and unsuccessful resuscitations. An overall success rate of 45 percent was achieved. Table 2 lists the results in the total number of patients; 33 of 71 (46 percent) were successfully resuscitated at least once. Of these patients, 21 left the hospital alive. Therefore, 30 percent of the patients in whom CPR was done, nearly two thirds of those successfully resuscitated, left the hospital alive.

Table 3 compares these results with those found in the literature.[2,6-8]

Table 4 separates the emergency room CPR patients by geographic origin and includes those judged dead on arrival. A 36 percent survival rate was obtained in both urban Carson City (18 of 50) and the rural area (5 of 14). When the dead-on-arrival patients were excluded, the figures are 39 percent for Carson City (18 of 46) and 50 percent for the rural area (5 of 10).

The duration of all in-hospital CPR's was also reviewed. They ranged from 6 minutes to 90 minutes, with an average time of 28 minutes. For emergency room CPR's it was impossible to determine the time of initiation of CPR and, therefore, duration could not be calculated.

Discussion

The results of the study compare favorably with those reported from other centers despite the unique problems of a small community hospital. These problems include the following:

- No house staff.
- A large service area.

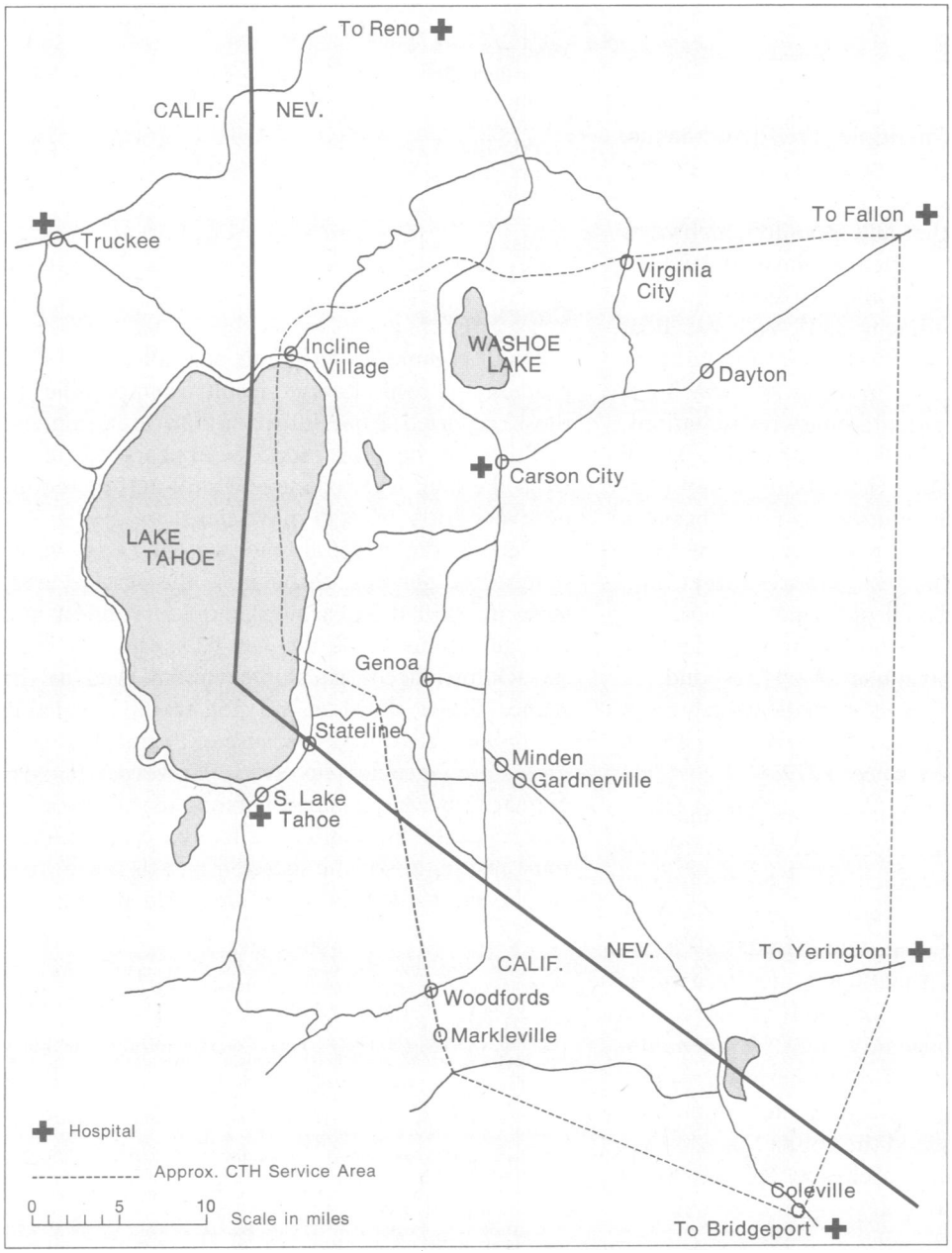

Figure 1.—Carson-Tahoe Hospital service area.

TABLE 1.—*Number of Successful and Unsuccessful Resuscitations in 81 Attempted Resuscitations*

Site	Attempted Resuscitations	Deaths	Survivors	
			Number	Percent
Emergency room	56	33	23	41
Inpatient	25	11	14	54
Totals	81	44	37	45

TABLE 2.—*Number of Patients Successfully Resuscitated and Number Discharged*

	Patients	Percent
Total	71	100.0
No. resuscitated	33	46.4
No. discharged	21	29.6

- Limited financial resources.
- Involvement of multiple fire departments, police agencies and counties, and—in our case—two states.
- Changeable weather and mountain highways.

A number of factors appear to have contributed to the success at Carson-Tahoe Hospital:

- An enthusiastic nursing staff, with excellent basic training and periodic refresher courses.
- Full-time emergency room staff, which responds to all cardiopulmonary resuscitations.
- Three on-call physicians responding to all CPR's. These include the on-call family physician, surgeon or internist and anesthesiologist. The first of these physicians on the scene is in charge of the resuscitative efforts until the patient's personal physician arrives.
- In addition, a respiratory therapist and an intensive care unit nurse always respond.
- An excellent emergency medical technician (EMT) program in which nearly 400 persons have been trained since 1972.

The EMT program deserves special mention because it appears that success in the emergency room is directly attributable to the persons trained in this program. The program is supervised by emergency room physicians and includes 80 hours of rigorous training. An attempt has been made to train those persons most likely to arrive on the scene first. Consequently, most firemen, police and highway patrol officers, sheriff's deputies, state park and forestry rangers, and ambulance attendants have completed the course. In addition, all members of Sierra Search and Rescue, many casino employees and many ski patrolmen also have been trained.

TABLE 3.—*Comparison of Cardiopulmonary Resuscitation Results*

	Number Patients	Percent Successful	Percent Discharged Alive
Carson-Tahoe	71	46.4	29.6
Denver[7]	201	36	17.5
Montreal[6]	1204	..	19
Seattle[2]	..	..	18-40
Hurst and Logue[8]	..	15-40	2-20

TABLE 4.—*Origin of Emergency Room Patients and the Results of Cardiopulmonary Resuscitation*

Origin	Dead on Arrival	Deaths	Total Deaths	Survivors	Total Patients
Carson City	4	28	32	18	50
Minden-Gardnerville	2	2	4	4	8
Genoa	0	0	0	1	1
Wellington	0	1	1	0	1
Markleville	0	2	2	0	2
Yearington	1	0	1	0	1
Dayton	1	0	1	0	1
Totals	8	33	41	23	64

Conclusions

Small community hospitals can achieve cardiopulmonary resuscitation results comparable to those reported from larger, urban area centers. Within the hospital, success appears to result from the high level of nursing skill and the cooperative efforts of staff physicians.

Outside the hospital, the presence of a large number of persons, throughout the service area, who are skilled in cardiopulmonary support and first aid seems to be the key to success. It must be acknowledged that some victims died at the scene. These statistics are not readily available for retrospective study because of the many county and state agencies involved. However, it does appear that when trained persons reach the scene before death and initiate effective cardiopulmonary resuscitation, the location and distance from the hospital make little difference in most cases.

REFERENCES

1. Graf WS, Polin SS, Paegel BL: A community program for emergency cardiac care, JAMA 226:156-160, 1973
2. Bystander resuscitations boosts MI survival. Med World News, Feb 21, 1977, p 52
3. Carveth SW, Herman L: Report of Symposium of the American Heart Association. Internal Medicine News 10:3, Jan 1, 1977
4. Waller JA: Urban-oriented methods: Failure to solve rural emergency care problems. JAMA 226:1441-1446, 1973
5. Standards for cardiopulmonary resuscitation and emergency cardiac care. JAMA 227(suppl):833-868, 1974
6. Lemire JG, Johnson AL: Is cardiac resuscitation worthwhile? A decade of experience. N Engl J Med 286:970-972, 1972
7. Vijay NK, Schoonmaker FW: Cardiopulmonary arrest and resuscitation. Am Fam Phys 12:85-90, 1975
8. Hurst JW, Logue RB: The Heart. New York, McGraw Hill Co., 1970, p 561